

## MEDICINAL PLANTS ARE A ROLE IN HUMAN HEALTH DISEASES AND THE ISOLATION OF PHYTOCHEMICAL THROUGH VARIOUS METHODS

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### ABSTRACT

*Medicinal plants are a gift of nature and the history of medicinal plants is very ancient. The value of medicinal drugs and their alkaloids are very effective against many human diseases. The drugs are synthetically prepared into the industries but the raw material of drugs can be obtained from various plant parts like stem, bark, roots, leaves, and other fibrous parts, etc. The pharma industries of drugs are very effective herbal drugs but they are very costly. The life of these drugs is not long when compared to herbal medicines. The human body is very sensitive to drugs and when any wrong drugs are applied to the body, then our immune system suppresses the drugs and produces a response against the drugs. The effectiveness of drugs and their specificities only on its targeting site take action upon it. The various microbial diseases can affect the human body by various modes of infection. The various techniques and methods are isolated medicinal drugs from medicinal plants.*

**KEYWORDS:** Medicinal Plants, Alkaloid Drugs, Pharma Industries & Immune Response

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### INTRODUCTION

Medicinal plants are a source of the new generation of covid-19 medicines. The medicinal pharmaceutical industries produced several types of alkaloids which are very effective and improved immune responses for a long time(Djilani et al., 2006). They are very effective against viral infection and immune diseases because they regulate some specific types of stimulus which can take action upon body dendrite cells and start to release phagocytosis cells to promote engulf affected cells. The nature of cells and their response is very specific for particular helper cells. The various chemicals and drugs are responsible for long stimulus recognition(Rasool et al., 2020). The herbal drugs are very effective in this case(Rasool et al., 2020). They have protected the human body from any side effects and provided long-term effects. The various techniques are very beneficial for the isolation of these drugs from various parts of plants. In these drugs, various phytochemicals are present (Adhikari et al., 2021)and they are releasing some cardiogenic compounds and release another long chain of unsaturated fatty acids and compounds at various levels. The methods of alkaloids production and isolation are very effective on the industrial and pharma level(Chaves et al., 2020). Drug production is only possible through extraction methods like physical, chemical, and biological(Maroyi, 2013). The medicine provides relief against neuromuscular disorder and nervous disorders and several other types of diseases(Rasool et al., 2020). These phytochemicals(Tolosa et al., 2007) can regulate immune

system cells of the body and help the release of interferons cells for the destruction of several cancerous and carcinoma cells. If the body is affected by any tumor cells, then these chemicals help into the stipulate to be macrophages cells and B-cells and Tc -cells at a particular site and release its effect from body other parts where are damaged or malignant cells are already present and to be killed by phagocytosis, pinocytosis phenomenon.

## **MATERIALS**

The plant materials are present in the various plants inside, the drugs and phytochemicals are present in the various parts of plants. The nature of these chemical compounds is very effective and gives us a long-term response. The plant dried or complete whole parts used as a material form. The various types of phytochemicals are present in the plant parts like bark, stem, roots, and other components of plants.

## **METHODS**

The various types of methods are applied for the treatment of humans through medicinal plants. The isolation of alkaloids from plants and prepared medicines are used for the treatment of various diseases. There are three types of methods that are applied physical, chemical, and biological methods based on alkaloid structure and chemical components. Here are the following methods are mentioned based on isolation.

### **Solvent Extraction Method**

Solvents extraction methods are widely used methods for the extraction of natural products. In this process, solvent penetrates the liquid matrix(Tolosa et al., 2007). the solute dissolves into the solvent. The liquid extraction method is popularly known as the solvent extraction method. The compounds are separated based on relative solubilities usually water and organic solvents. The distribution ratio is equal to the concentration of a solute in the organic phase divided by its concentration in the aqueous phase(Pandey S; Shukla A; Pandey S; Pandey A, 2017). Usually, solvents are immiscible and solutes are immobile. Solvent extraction methods are various types based on separation of solvent like batch single-stage extraction, dispersive liquid-liquid microextraction, direct organic extraction, multistage counter current continues processes, extraction without chemical change ion-exchange mechanism, etc(Djilani et al., 2006). These methods are various benefits for those compounds which are easily isolated, the low weight molecular compounds are easily separated through these methods. The various phytochemicals especially which are easily dissolved into the organic solvents are dissolved into the water they are easily separated through these techniques.

### **Immersion Method**

It is a method to dissolve out phytochemicals inappropriate solve at room temperature is more than  $>80^{\circ}\text{C}$ . The heigh weight molecular compounds are easily separated and purified at room temperature. The nature of compounds is different because the long chain of carbon compounds varies from different substances. The degree of saturation is high at the initial stages but after some time it will be slow according to the time management and substance nature. The quality of substances and their components are observed in between during this process(Djilani et al., 2006).

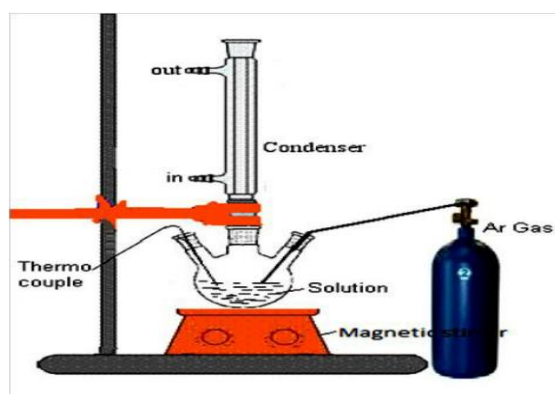
### **Percolation Method**

The core particles of plants' phytochemicals are loaded into the percolate tube. and immersed with a suitable solvent for 24-48 hours. Then collect the percolate substance at the bottom of the percolate apparatus. After that, new substances will be added to the top of the percolate tube(Anderson et al., 2013). This process is a very high-efficiency method. because the

substance concentration varies during the processes. The complex or chemical substances will be consumed for a long time and the process will take a long duration of time.

### Refluxing Methods

It is a method of extraction of plant chemicals constituents by organic solvent using heating and refluxing. Refluxing apparatus is important apparatus for conserving solvent and it prevents loss of excess solvent. The operators to remove excess toxicity from the solvent and prevent useful chemicals from wastage(Wubetu et al., 2017). It is very effective for the extraction of lipophilic phytochemicals, such as steroids, anthraquinones, and terpenoids. Its method is very highly effective and efficient but complex and solvent f alkaloids, chemicals are more much consumable(Maroyi, 2013).



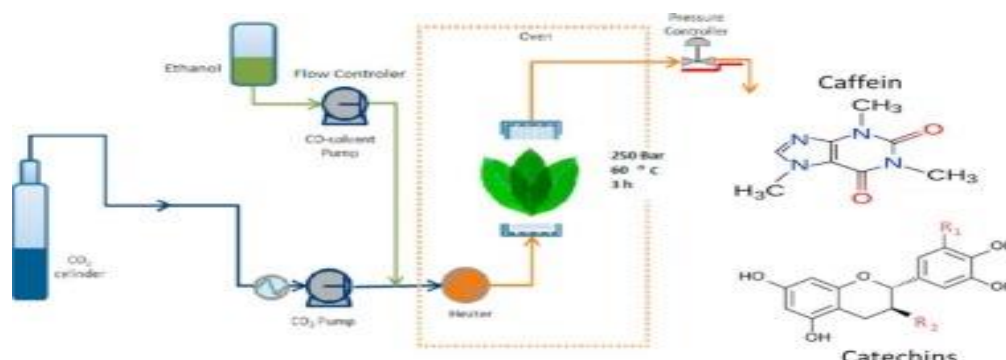
**Figure 1: Schematic Representation of Refluxing Methods Through Isolation of Bioactive Compounds.**

### Constant Refluxing Method

It is a method based on refluxing method. Soxhlet extractors are used most frequently in refluxing apparatus. this method avoids excess consumption of solvent chemicals and solvent at a particular level. The method is more complex(Tolosa et al., 2007). It is not usually applied for the extraction of thermally unstable compounds. The isolation of chemical compounds is very specific. The trends of saturated carbons and anhydrous compounds are not applicable. Only specific compounds are applied successfully for the extraction of solvents(Cilia et al., 2009).

### Supercritical Fluid Extraction Method

The supercritical fluid method represents the supercritical fluid condition in which plant contact with the supercritical fluid(Yubin et al., 2014). It will be controlled by various temperatures, pressures, and different kinds and contents of trainers the supercritical fluid can be selectively extracted the high polarities, high pressures, and high molecular weights. The critical point of pure substances always exists in high vapor pressures and temperature exists can be in liquid-vapor extraction(Rasool et al., 2020). The pressure and temperature are always high to form a single liquid homogenous chemical mixture fluid, also known as a supercritical fluid. The SF is a mixture of high volume gas and vapor solvent pressure(Tolosa et al., 2007). This method is very effective successfully applied for extraction alkaloids from medicinal plants, phytochemicals from plants and preparing several generic medicines for new generation and it is a less costly and efficient method(Tan & Yiap, 2009).



**Figure 2: Schematic Representation of Supercritical Fluid Extraction Method through the Sample of cChemical.**

### Chemical Methods

The various chemical methods are successfully manipulated in the isolation of the drugs. the chemical constituent of the drugs and its effectivity on the basis(Kushnirov, 2000). The various chemicals are used according to the various concentration. Organic chemicals are maybe two types; heterogeneous and non-heterogeneous. The nature of the chemicals and reactivity with the constituents of alkaloids are specific. Water acts as a good solvent because it will be easy in any form and dissolve all substances(Luís et al., 2016).

### Ether Acetone Extraction Method

In this method, the chemical constituents are used as a form of extraction solvent. The nature of chemicals is specific for covalent bonding and carbonic anhydrous bond(Cilia et al., 2009). The alkaloids are extracted in the form of liquid. The powder or dry matter is used as a raw material for the isolation of the drugs(Chaves et al., 2020). The nature of substances is very effective and it can help in the breakdown of bonding between the compounds. The solvent can be rotated at more than 1000 rpm (Wubetu et al., 2017) in the rotary shaker. Sometimes, it can be used benzene derivates for the isolation of phytochemicals from medicinal plants.

### Liquid and Solvent Extraction Methods

It is a very effective method for the isolation of those compounds which are easily immersed into the organic solvent(Luís et al., 2016). The nature of chemical substances is used accordingly to the reactive substance. the long chain of hydrocarbon compounds is firstly breakdown into the presence of chemicals and enzymes(Adhikari et al., 2021). The enzymes are may highly specific and they can take action upon its bond to dissociate it. the terpenoids and chemical substances are separated accordingly to the sizes of range. The timing of isolation is different because it will depend upon enzyme reactivity(Pandey S; Shukla A; Pandey S; Pandey A, 2017). The substances like benzoic acid, sulphonamide, sulpha extras, and very types of other components are dissolved into the solvent(Tolosa et al., 2007). The high molecular weight compounds are not easily isolated because the reactivity of these substances is very high so not perform the color into the medium but the lightweight molecular compounds are easy to separate d because they can be performed color into the medium and solubilities of these compounds are very high so they are easy to be isolated.

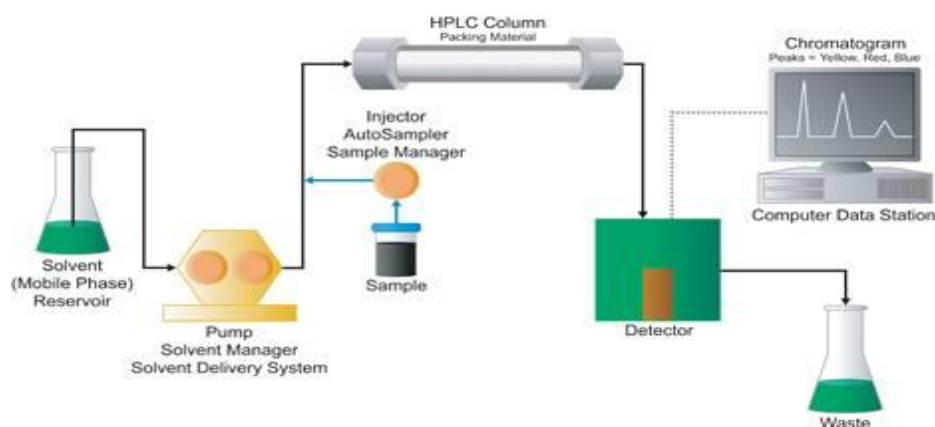
### Alcohol Extraction through Alkaloids

The isolation of alkaloids through alcohol is a specific and effective method. The pre solvent alcohol ethanol is used as a solvent to dissolve many alkaloids into the form of compounds like phytochemicals. The isolation methods are specific

only in the laboratory(Yubin et al., 2014). The various parameters are used and measured for the concentration of drugs after the isolation. The temperature is below the environment temperature. The methods are applied to the specific chemicals(Cilia et al., 2009). The highly unstable compounds are not easy to operate by this method.

### Liquid Chromatography Methods

The isolation of solvent chemical constituents methods is very specific so based on color identification to be used chromatography methods. The methods are used based on solubilities in the medium. The solvent is dispersed into the solute medium(Maroyi, 2013). Here are two phases that are permitted one is the mobile phase and the second stationary phase(Rasool et al., 2020). The one is called the carrier phase and the second is acts as the retention phase when solutes are dispersed into the solvent medium they can be retained and pass through it and perform color this is the sign of compounds isolation(Tan & Yiap, 2009). The chemical nature of paper which is made up of nylon or other tissue soft part and show that peculiar compounds identification. Chromatography is various types based on solubilities like solid-liquid phase chromatography, liquid-phase chromatography, liquid gas chromatography, etc.



**Figure 3: High-Performance Liquid Chromatography Method for Isolation of Phytochemicals from the Sample.**

### Biological Methods

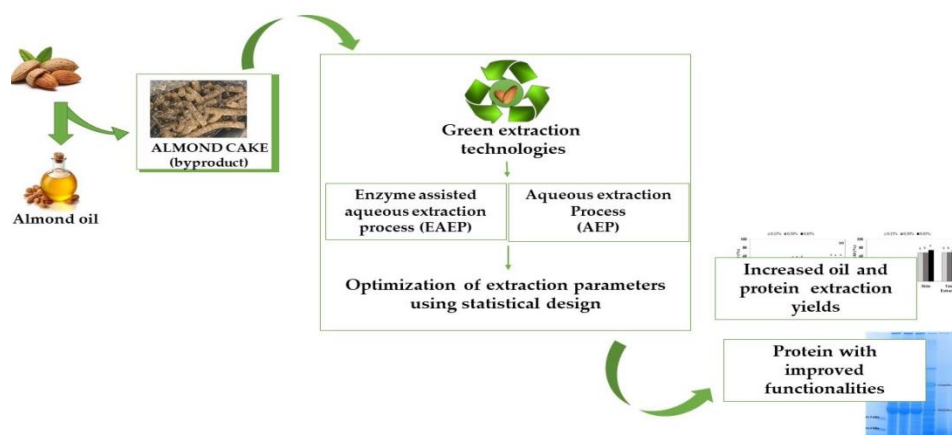
The biological methods are very effective for the isolation of drugs from medicinal plants. the various enzymes are used for the isolated purpose from the plant dry matter. The main source of drugs is root, stem, leaf, bark, and other parts of the plant, etc. the enzymes are made up of natural substances and extracted from various sources. The nature of enzymes is very specific to any substance.

### Alpha Cellulose Extraction Method

The method is very specific in which compounds are used in the form of liquid and maybe crushed form. The enzymes for example papaya extracted enzymes are used for the isolation of breakdown of cellulose bonding in between the matrix of plan components. The cellulose enzymes are specific for taking action upon it and dissociating it. the reactivity of enzymes is varied(Adhikari et al., 2021). The Ph of enzymes exist in between 5-6.5 in the range, the enzymes mainly break down the alpha bonding in the nucleic acids and carbohydrates and dissociate into the small compounds and small units of monomers(Rasool et al., 2020). The highly unstable compounds are not easy to dissociate so applied it will be several types but the reactivity of enzymes are very specific.

### Enzyme -Chemical Extraction Method

This method is also known as the solvent enzyme extraction method. Here, plant parts like root, stem, leaf, and bark are directly used and after that crushed with the help of a motor into fine pieces and rotated at 1000 rpm (Electrophoresis, 2009) for one hour and that material will be separated (Adhikari et al., 2021) and add specific enzymes within chemical constituents and again shake hour (Wubetu et al., 2017). The final compounds are separated because when we have added enzymes they will react to carbon bonding break down it and chemicals dissolve the high weight compounds change into the small units of compounds (Chaves et al., 2020). The drugs, alkaloids, terpenoids, saponins, and various chemical constituents are easy to separate and analyze into the reaction with an organic solvent and separated finally and visualized figure 1.1. The extract chemical clouds are very effective and they will be separated based on polarity (Pandey S; Shukla A; Pandey S; Pandey A, 2017). The solvent is very effective in the case of alkaloids isolation. the high molecular compounds are derivative long-chain hydrocarbons and very perform instability so based on solubility the size of compounds are varied and react from the enzyme chemical solution. Where solvent chemicals are dissolved into the chemical organic solution and based on precipitation we have separated out (Djilani et al., 2006)? and visualize under any other solution which gives us results in a short duration as compared to prolonged solution. The effectivity and nature of components vary because there are so many hydrocarbons are present in the conjugation form if separation occurs according to the sizes then the result will be different so we have applied a common solution of enzymes and fatty acids are dissociated into this solution only saturated fatty acid compounds will be available (Niu et al., 2018).



**Figure 4: Extraction of Chemical and Enzyme Method Isolation the Plant Parts Advanced.**

### Techniques for the Isolation of Drugs

The various advanced techniques are very effective for the isolation of drugs and easy to separate from the various herbal drugs (Adhikari et al., 2021).

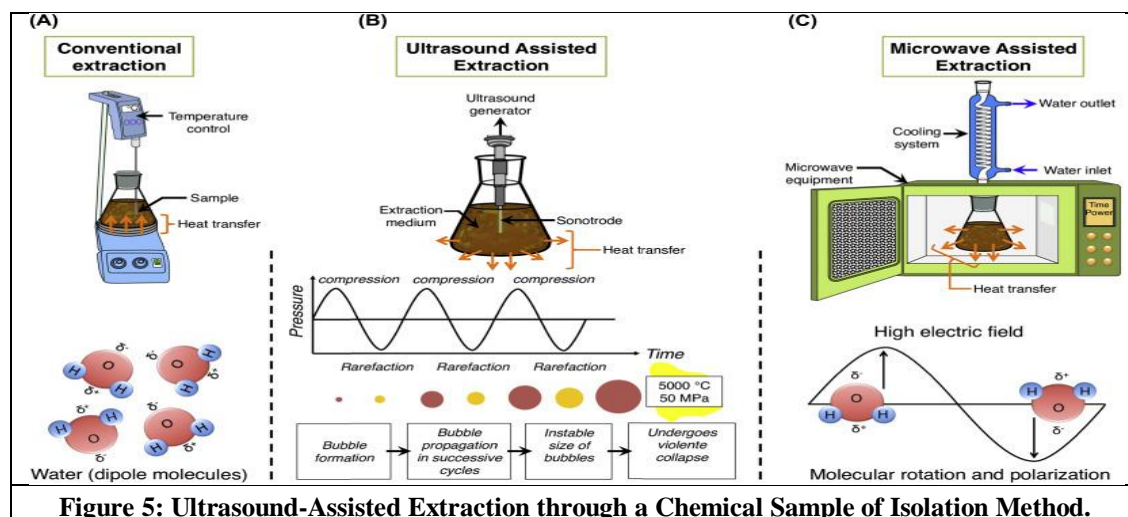
### Ultrasound-Assisted Extraction

Ultrasound is an intensification technique that is widely used for extraction of bioactive compounds (Tolosa et al., 2007) or products from natural plants with application in industries like pharma industries, food industries, etc (Maroyi, 2013). The process is based upon the acoustic cavitation phenomenon, which consists of the formation of the transient gas bubble by the compression and expansion cycle caused by the passage of ultrasonic waves through the liquid (Vilhena et al., 2015) and subsequent and to release bioactive compounds from the membrane. The rupture depends upon extraction



methods(Wubetu et al., 2017).

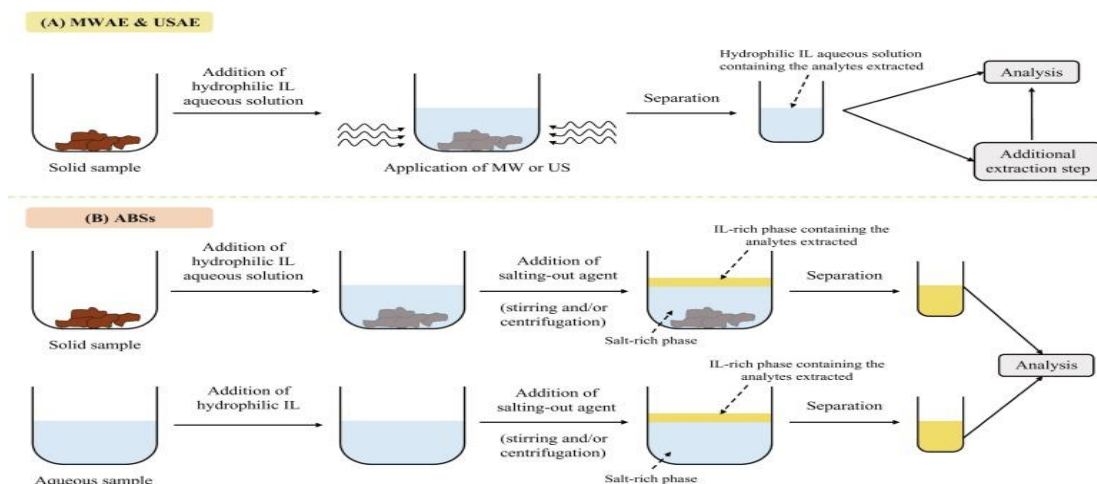
As bubbles accumulate the energy they reach a specific point and where they implode and release the energy instantaneously. breakdown the intermolecular interaction between the target compound and matrix of the sample as well as causing mechanical effect(Tolosa et al., 2007) including reduction of particle size according to the strength of compounds. The techniques are very highly effective and damage the cell allowing more significant interaction between solvent and sample. consequently improving the mass transfer which in turn will be returned higher yields in a shorter time figure. 1.1.



### Microwave-Assisted Extraction

It is a novel extraction method and is conveniently very effective for isolation of compounds but some limitations occurred here(Djilani et al., 2006), such as waste quantities solvent are used, high temperature, long extraction time, needed(Rasool et al., 2020). Microwaves are nonionizing electromagnetic waves, located between the frequency range at the lower frequency and infrared at the higher frequency in the electromagnetic spectrum within the frequency band of 300 MHz to 300GHz.

In this extraction technique, the microwave energy delivers through polar components penetration to heat generated by conversion of electromagnetic to thermal energy. this conversion occurs(Tan & Yiap, 2009) via two mechanisms: by dipole rotation, i.e. through reversals of dipoles and by ionic conduction. By displacing the charged ions present into the solutes as well as solvent(Yadav et al., 2017). When microwave energy start absorption occur the conversion of electromagnetic energy into heat depends on the relation between the dielectric factor and dielectric constant for a given material(Bleakley & Hayes, 2017). This relation is known as the dissipation factor. This is a conventional technique for the extraction of active components from medicinal plants, using microwave energy to heat containing solvent sample thereby partitioning analytes from sample matrix into the solvent figure. 1.1.



**Figure 6: Microwave-Assisted Extractions and Isolation of Chemical Components Sample.**

Various medicinal plants are a very important role in the treatment of human diseases. These plants are sources of phytochemicals and natural herbal drugs. The new several generic medicines are prepared by these medicinal plants. They are acting as an anti-stimulant and perform various functions in the human body. Accordingly, to the Indian medical association ( icmr, New Delhi ), herbal drugs are very effective against several nervous disorders and perform good results for a long time. Several techniques are beneficial for the isolation of these medicinal alkaloids and pharma drugs.

## RESULTS

The various methods are beneficial for the isolation of secondary metabolites from the herbal drugs in the pharma industries and useful for various diseases like Syno-Vascular joint diseases, cancerous diseases, myeloma diseases, bar kit lymphoma diseases, erythroblastosis, leukemia, and other nervous diseases like heart cardiovascular diseases, brain cancer, and liver jaundice and covid-19 various diseases are treated by various medicinal plant drugs. The drugs are very specific to various body parts of the nervous system as well as the parasympathetic and sympathetic nervous systems. The value of herbal drugs in the international market and Indian economy are very high due reason behind is the herbal drugs are very natural and less toxic for human health. They vary effective against microbial biodiversity pathogens and various groups of species. They are directly killed through the methods of toxin production and damage kill to the cell wall of the pathogen. and damage all organelles of the pathogen cell membrane system. They are affected by the pathogen membrane directly or indirectly to activate the human body's immune system. The mode of action of production neural toxin to kill the microorganism body. They are killed by the pathogen by mode of apoptosis and or maybe killed through antitoxin formation against the pathogen. The various techniques are helpful in the isolation of these types of drugs and prevent damage of chemical quality. The techniques are very helpful in the manipulation of toxic compounds and save their reactivity. they are very beneficial for the production of metabolites through the microbial enzymes and help in the manipulation of long-chain terpenoids and alkyl halides.

## CONCLUSIONS

Medicinal plants are important sources of new medical fields. the new upcoming medicine is not much for efficient for human health. The conservation of medicinal plants and their valuable drugs for pharma industries and herbal drugs is very significant as per now covid new vaccines. Synthetic drugs are not produced many more long effects as compared to herbal



drugs on the human body. The herbal drugs are less costly and very safe for human health. They provide manipulation helper cells of the immune system and release various toxic chemicals for the malignant cells. The response of phytochemical and plants alkaloid drugs are very specific and pharma industries medicines are generated from new medicinal plant species. Various techniques help in the manipulation of alkaloids and provide good quality drugs without the loss of chemical compounds. the quality of any drug always depends upon its constituents. so the isolation methods are very specific and very safe. The new generation technologies are very effective for the preparation of and extraction of phytochemicals from various plant sources. Human health is a major issue because today time many types of mutation and heritable diseases are arising with new medical discoveries. the profit of pharma industries depends upon manufacturing medicinal process and dose of multiplication. A limited number of sources are available because medicinal plants are limited but if we have to conserve under fields and multiply by various methods, we are conserving for it long time.

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